III. In the Claims:

Please amend claims 1-8 and 10-13 and cancel claims 9 and 14 as follows:

1. *(currently amended)* A [~~method for determining the aspect ratio in a channeled~~] micro channel heat exchanger for gaseous fluids , in which the micro channels have a surface area density greater than 10000 m^2/m^3 and a constant volume ,the micro channels in the heat exchanger having an aspect ratio seleccted *a priori* by [~~comprising~~]:

determining the thermal performance of the heat exchanger to obtain data with regard to a channel corresponding to heat transfer rate, velocity and flow;

plotting the performance curves of 1) pressure loss in the channel for the hot side; 2) pressure loss in the channel for the cold side; 3) heat flux; and 4) heat transfer rate against an axis corresponding to aspect ratio;

determining a range of aspect ratios based on the curves plotted in which the points on the aspect ratio axis corresponding to the intersections of the maximum and minimum of the gradients of the heat flux and heat transfer curves define the range and

selecting an aspect ratio for the micro channel from the range of aspect ratios determined .

2. *(currently amended)* The [method] heat exchanger of claim 1 [in which] wherein the thermal performance of the heat exchanger is determined in accordance with the formulae:

$$\frac{\partial}{\partial x_i}(\rho u_i) = 0 \ ;$$

$$\rho u_j \frac{\partial u_i}{\partial x_j} = -\frac{\partial p}{\partial x_i} + \rho g_i + \frac{\partial \tau_{ij}}{\partial x_j} \quad \text{where} \quad \tau_{ij} = \mu\left(\frac{\partial u_i}{\partial x_j} + \frac{\partial u_j}{\partial x_i}\right) + \left(\beta - \frac{2}{3}\mu\right)\frac{\partial u_k}{\partial x_k}\delta_{ij}; \text{ and}$$

$$\rho u_i \frac{\partial h}{\partial x_i} = \frac{\partial p}{\partial t} + u_i \frac{\partial p}{\partial x_i} + \phi + \frac{\partial}{\partial x_i}\left(k \frac{\partial T}{\partial x_i}\right) \quad \text{where} \quad \phi = \tau_{ij}\frac{\partial u_i}{\partial x_j} \ .$$

3. *(currently amended)* A [~~method for determining the aspect ratio in a channeled~~] micro channel heat exchanger for gaseous fluids in which the micro channels have a surface area density greater than 10000 m^2/m^3 and the design specifications for the volume of the channels are variable and require an aspect ratio less than or equal to 10, wherein the aspect ratio of the micro channels is determined *a priori* by [~~comprising~~] :

determining the thermal performance of the heat exchanger to obtain data with regard to a channel corresponding to heat transfer rate, velocity and flow;

plotting the performance curves of 1) pressure loss in the channel for the hot side; 2) pressure loss in the channel for the cold side; 3) heat flux; and 4) heat transfer rate against an axis corresponding to aspect ratio;

determining a range of aspect ratios based on the curves plotted in which the points on the aspect ratio axis corresponding to the intersections of the maximum and minimum of the gradients of the heat flux and heat transfer curves define the range; and

from the range, determining the dimensions of the micro channels in accordance with the steps of

determining Nu based on fluid properties;

fixing an allowable pressure loss ΔP;

predetermining a channel length, ℓ, for a given space;

calculating b from the equation: $b^4 = \dfrac{12\mu k_f Nu\ell^2}{\rho c_p \Delta P}$;

determining $AR^{opt} = \{(H_1, w_1), (H_2, w_2), \ldots\ldots\ldots, (H_n, w_n), \ldots\ldots\ldots\}$, $w_c = b$;

determining $AR = \dfrac{H}{w_c}$, $H = w_c AR_{opt}$; and

determining $w_s = H\sqrt{\dfrac{k_f Nu}{6k_s}}$, $w_s = w_c AR_{opt}\sqrt{\dfrac{k_f Nu}{6k_s}}$.

4. *(currently amended)* The [method] heat exchanger of claim 3 in which the thermal performance of the heat exchanger is determined in accordance with the formulae:

$$\frac{\partial}{\partial x_i}(\rho u_i) = 0 \quad ;$$

$$\rho u_j \frac{\partial u_i}{\partial x_j} = -\frac{\partial p}{\partial x_i} + \rho g_i + \frac{\partial \tau_{ij}}{\partial x_j} \quad \text{where} \quad \tau_{ij} = \mu\left(\frac{\partial u_i}{\partial x_j} + \frac{\partial u_j}{\partial x_i}\right) + \left(\beta - \frac{2}{3}\mu\right)\frac{\partial u_k}{\partial x_k}\delta_{ij}; \text{ and}$$

$$\rho u_i \frac{\partial h}{\partial x_i} = \frac{\partial p}{\partial t} + u_i \frac{\partial p}{\partial x_i} + \phi + \frac{\partial}{\partial x_i}\left(k \frac{\partial T}{\partial x_i}\right) \quad \text{where} \quad \phi = \tau_{ij}\frac{\partial u_i}{\partial x_j} .$$

5. *(currently amended)* The [method] <u>heat exchanger</u> of claim 3 in which the validity of the dimensions determined is verified by application of the formula:

$$\frac{H}{b} << \pi^2 \left[\frac{k_s}{6k_f Nu}\right]^{1/2} .$$

6. *(currently amended)* <u>In a method for establishing a manufacturing design for a micro component heat exchanger for gaseous fluids,</u> [A method for] determining <u>a priori</u> the aspect ratio [in a channeled heat exchanger for gaseous fluids in] <u>of the micro channels in the heat exchange wherein</u> [which] the micro channels have a surface area density greater than 10000 m^2/m^3 and the design specifications for the volume of the channels are variable and require an aspect ratio greater than 10, comprising:

determining the thermal performance of the heat exchanger [in accordance with the formulae] to obtain data with regard to a channel corresponding to heat transfer rate, velocity and flow;

plotting the performance curves of 1) pressure loss in the channel for the hot side; 2) pressure loss in the channel for the cold side; 3) heat flux; and 4) heat transfer rate against an axis corresponding to aspect ratio;

determining a range of aspect ratios based on the curves plotted in which the points on the aspect ratio axis corresponding to the intersections of the maximum and minimum of the gradients of the heat flux and heat transfer curves define the range; and

from the range, determining the dimensions of the micro channels in accordance with the steps of.

determining Nu based on fluid properties;

fixing an allowable pressure loss ΔP;

predetermining a channel length, ℓ, for a given space;

calculating b from the equation: $b^4 = \dfrac{12\mu k_f Nu\ell^2}{\rho c_p \Delta P}$;

calculating α from the equation: $\alpha = \dfrac{k_f Nu}{k_s}$;

determining $AR = \dfrac{H}{w_c}$ and $w_c = \dfrac{2^{1/6} b^{4/3}}{\alpha^{1/6} H^{1/3}}$: $w_c = \dfrac{2^{1/8} b}{\alpha^{1/8} AR_{opt}^{\ 1/4}}$; and

determining $AR = \dfrac{H}{w_c}$: $H = w_c AR_{opt}$.

7. *(currently amended)* The method of claim [1] <u>6 wherein</u> [in which] the thermal performance of the heat exchanger is determined in accordance with the formulae:

$$\frac{\partial}{\partial x_i}(\rho u_i) = 0 \ ;$$

$$\rho u_j \frac{\partial u_i}{\partial x_j} = -\frac{\partial p}{\partial x_i} + \rho g_i + \frac{\partial \tau_{ij}}{\partial x_j} \text{ where } \tau_{ij} = \mu\left(\frac{\partial u_i}{\partial x_j} + \frac{\partial u_j}{\partial x_i}\right) + \left(\beta - \frac{2}{3}\mu\right)\frac{\partial u_k}{\partial x_k}\delta_{ij}; \text{ and}$$

$$\rho u_i \frac{\partial h}{\partial x_i} = \frac{\partial p}{\partial t} + u_i \frac{\partial p}{\partial x_i} + \phi + \frac{\partial}{\partial x_i}\left(k \frac{\partial T}{\partial x_i}\right) \text{ where } \phi = \tau_{ij} \frac{\partial u_i}{\partial x_j} \quad .$$

8. *(currently amended)* The method of claim 6 wherein [in which] the validity of the dimensions determined is verified by application of the formula:

$$\frac{H}{b} >> \frac{\pi^{0.75}}{(2\alpha)^{0.25}} \quad .$$

9. [*cancelled*]

10. *(currently amended)* A [~~system for manufacturing a~~] manufactured micro channel heat exchanger [~~comprising:~~] having a predetermined [determining the] maximum allowable pressure loss and [the] flow rate of hot fluid and cold fluid on the opposite sides of the channels wherein [~~; and optimizing~~] the channel height, channel width and the thickness of a solid material between the channels is in accordance with [~~the method of~~] claim 1 or claim 2 or claim 3 or claim 4 or claim 5 or claim 6 or claim 7 or claim 8 [; adapting] wherein the [optimized] dimensions obtained in [~~the step of~~] optimizing to the requirements of a given manufacturing specification are determined by compromising the optimized dimensions to the requirements of a manufacturing design for the micro channel heat exchanger.

11. *(currently amended)* A [system] heat exchanger of claim 10 wherein [in which] a predetermined pumping power is a determinant of the maximum allowable pressure loss.

12. *(currently amended)* A [system] heat exchanger of claim 10 wherein [in which the determination of] the maximum allowable pressure loss and the flow rate of hot fluid and cold fluid on the opposite sides of the channels is a function of [a] one or more predetermined dimension established for the channels.

13. *(currently amended)* The [system] heat exchanger of claim 12 wherein [in which] the predetermined dimension established for the channels is length.

14. *(cancelled)*